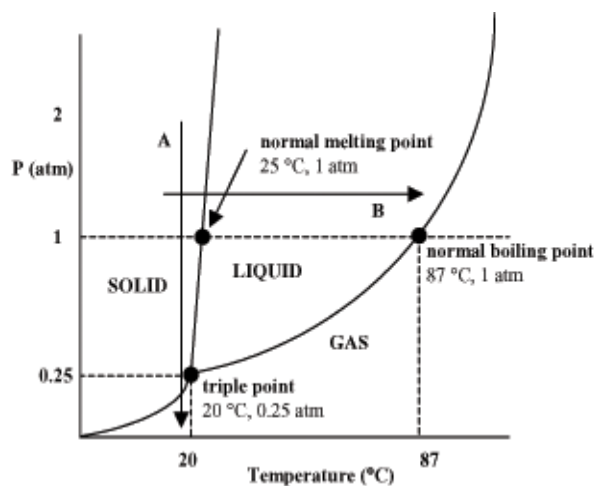**Marks**
4

- A phase diagram of a pure compound has a triple point at 20 °C and 0.25 atm, a normal melting point at 25 °C, and a normal boiling point at 87 °C.

Describe what happens when the pressure is reduced from 2 atm to 0.05 atm at a constant temperature of 15 °C?

The data allows the phase diagram below to be drawn.

Arrow A shows the effect of reducing pressure from 2 atm to 0.05 atm, at 15 °C. The compound passes directly from a solid to a gas: it *sublimes*.

Describe what happens when the temperature is raised from 13 °C to 87 °C at a constant pressure of 1.25 atm?

Arrow B shows the effect of increasing the temperature from 13 °C to 87 °C at *P* = 1.25 atm. The substance passes from solid to liquid: it melts.

Which is more dense, the solid or the liquid? Explain your reasoning.

The solid is more dense. The gradient of the solid/liquid equilibrium line is positive. If the pressure is increased when the compound is on the solid/liquid equilibrium line moves the compound into the solid region. Hence, the solid is more stable than the liquid under increased pressure so it must occupy less volume. It must therefore be more dense than the liquid.